

## Claims

1. Substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of chromium, molybdenum or tungsten, wherein at least one of the substituents of the cyclopentadienyl ring carries a rigid donor function which is not exclusively bonded through  $sp^3$ -hybridized carbon or silicon atoms.

5

10 2. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 1, of the general formula (I)

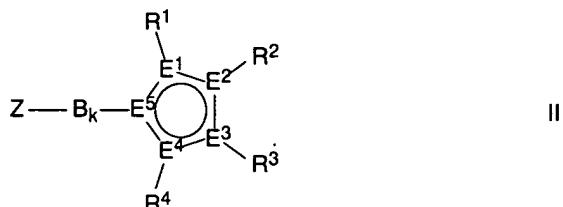


15 in which the variables have the following meaning:

M chromium, molybdenum or tungsten

Y is described by the following general formula II

20



25

in which the variables have the following meaning:

30  $E^1-E^5$  carbon or at maximum one of  $E^1$  to  $E^5$  is phosphorus or nitrogen,

Z  $NR^5R^6$ ,  $PR^5R^6$ ,  $OR^5$ ,  $SR^5$ , or an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system,

35

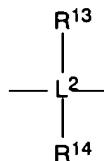
B one of the following groups:



40

and additionally, if  $z$  is an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system,  $B$  can also be

5



10

in which

$L^1, L^2$  denotes silicon or carbon,

15 k denotes 1, or if z is an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system, is also 0,

20 X independently of one another fluorine, chlorine, bromine, iodine, hydrogen, C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>2</sub>-C<sub>10</sub> alkenyl, C<sub>6</sub>-C<sub>20</sub> aryl, alkylaryl with from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, NR<sup>15</sup>R<sup>16</sup>, OR<sup>15</sup>, SR<sup>15</sup>, SO<sub>3</sub>R<sup>15</sup>, OC(O)R<sup>15</sup>, CN, SCN,  $\beta$ -diketonate, CO, BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, or bulky non-coordinating anions,

25

R<sup>1</sup>-R<sup>16</sup> independently of one another hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>6</sub>-C<sub>20</sub> aryl, alkylaryl with from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, SiR<sup>17</sup><sub>3</sub>, in which the organic radicals R<sup>1</sup>-R<sup>16</sup> can also be substituted by halogens, and two geminal or vicinal radicals R<sup>1</sup>-R<sup>16</sup> can also be joined to a 5- or 6-membered ring,

35 R<sup>17</sup> independently of one another hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>6</sub>-C<sub>20</sub> aryl, alkylaryl with from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, and two geminal radicals R<sup>17</sup> can also be joined to a 5- or 6-membered ring,

$n$  is 1, 2 or 3,

*12/1*  
m is 1, 2 or 3.

3. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of chromium of claims 1 through 2.

4. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 2, in which Z is an unsubstituted, substituted or condensed, heteroaromatic ring system.

5. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 2, in which  $E^1E^2E^3E^4E^5$  together with  $R^1R^2R^3R^4$  is an unsubstituted or substituted indenyl.

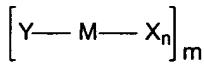
6. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 5, in which  $E^1E^2E^3E^4E^5$  together with  $R^1R^2$  is an indenyl.

7. The substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 6, in which Z is an unsubstituted or substituted 8-(quinolyl) system, and k is 0.

25

8. A process for polymerization or copolymerization of olefins, in which olefins are polymerized in the presence of the following components:

30 (A) the substituted monocyclopentadienyl, monoindenyl, monofluorenyl or heterocyclopentadienyl complexes of claim 1, of the general formula (I)



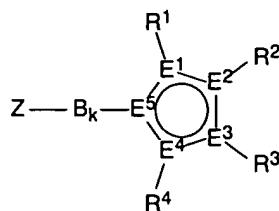
I,

35

in which the variables have the following meaning:

M chromium, molybdenum or tungsten

40 Y is described by the following general formula II



5

11

in which the variables have the following meaning:

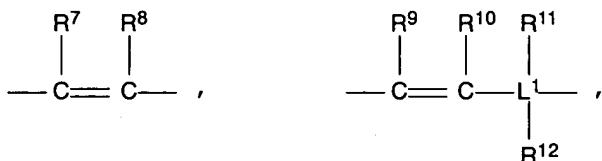
10

$E^1-E^5$  carbon or at maximum one of  $E^1$  to  $E^5$  is phosphorus or nitrogen,

Z NR<sup>5</sup>R<sup>6</sup>, PR<sup>5</sup>R<sup>6</sup>, OR<sup>5</sup>, SR<sup>5</sup>, or an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system.

B one of the following groups:

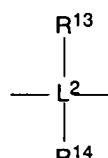
20



25

and additionally, if  $Z$  is an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system.  $B$  can also be

30



in which

$L^1$ ,  $L^2$  denotes silicon or carbon,

35

k denotes 1, or if Z is an unsubstituted, substituted or condensed, partially unsaturated heterocyclic or heteroaromatic ring system, is also 0,

40

MIHAN et al.

OZ 0050/50544

X independently of one another fluorine, chlorine, bromine, iodine, hydrogen, C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>2</sub>-C<sub>10</sub> alkenyl, C<sub>6</sub>-C<sub>20</sub> aryl, alkylaryl with from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, NR<sup>15</sup>R<sup>16</sup>, OR<sup>15</sup>, SR<sup>15</sup>, SO<sub>3</sub>R<sup>15</sup>, OC(O)R<sup>15</sup>, CN, SCN,  $\beta$ -diketonate, CO, BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, or bulky non-coordinating anions,

10  $R^1-R^{16}$  independently of one another hydrogen,  $C_1-C_{20}$  alkyl,  
 $C_2-C_{20}$  alkenyl,  $C_6-C_{20}$  aryl, alkylaryl with from 1 to 10 C  
 atoms in the alkyl radical and from 6 to 20 C atoms in  
 the aryl radical,  $SiR^{17}_3$ , in which the organic radicals  
 $R^1-R^{16}$  can also be substituted by halogens, and two gemi-  
 nal or vicinal radicals  $R^1-R^{16}$  can also be joined to a 5-  
 15 or 6-membered ring,

R<sup>17</sup> independently of one another hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>6</sub>-C<sub>20</sub> aryl, alkylaryl with from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, and two geminal radicals R<sup>17</sup> can also be joined to a 5- or 6-membered ring.

*n* is 1, 2 or 3,

25                    m        is 1, 2 or 3,

(B) optionally, one or more activator compounds,

and

30

(C) optionally, one or more additional catalysts conventionally used for the polymerization of olefins.

9. The process of claim 8, in which the activator compound (B) is a  
35 compound selected from the group of aluminum oxane, dimethylani-  
liniumtetrakis(pentafluorophenyl) borate, trityltetrakis(pentafluorophenyl) borate, or trispentafluorophenylborane.

10. The process of claim 8, in which at least one olefin selected from the group of ethene, propene, 1-butene, 1-pentene, 1-hexene, 1-heptene, 1-octene, or 1-decene is polymerized.
- 5 11. The process of claim 8, characterized in that an olefin selected from the group of propene, 1-butene, 1-pentene, 1-hexene, 1-heptene, or 1-octene is polymerized.
- 10 12. The process of claim 8, in which the polymerization is conducted in suspension, in solution, or in the gas phase.
13. Polymers of olefins, obtainable by the method of claim 8.
- 15 14. Fibers, films and moldings, containing polymers of olefins of claim 13 as essential components.

20

25

30

35

40